INTERACTION EFFECTS OF TEACHER ENTHUSIASM AND STUDENT NOTETAKING ON RECALL AND RECOGNITION OF LECTURE CONTENT

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The purpose of this study was to determine whether teacher enthusiasm and student notetaking activity would interact to produce significant differences in students' learning from lecture. Three modes of student learning activity (listen only, notes, notes plus review) were crossed with two levels of lecturer enthusiasm (less enthusiastic, more enthusiastic) in a 3X2 MANOVA design. Dependent variables were simple recall, complex recall, and recognition of lecture content. Results showed a significant interaction for simple recall. Also, a significant main effect was obtained for learning activity. Findings are discussed with respect to how learning activity and teacher behavior can function jointly in student processing of information. Suggestions for future research are given in light of limitations to the present study.

AN important principle derived from contemporary instructional research is that the outcomes of learning depend not mainly on what the teacher presents but jointly on teaching activity and learner activity during acquisition (Shuell, 1988; Thomas, 1988). This brings consideration of students' learning activities into the realm of instructional communication research with its interest in how teacher communication behavior influences student learning outcomes. Yet instructional communication researchers have given scant attention to how teacher behavior and student learning activity jointly determine student learning. Further, few studies of learning activities have looked at how they are affected by or interact with teacher communication behavior in predicting student performance. There are numerous teaching strategies and learning activities that can be examined in this regard. This study considered teacher enthusiasm and student notetaking activity. Teacher enthusiasm is frequently studied by instructional researchers as a significant determinant of teacher effectiveness and student outcomes (Brophy & Good, 1986). Notetaking is a very common and fundamental learning activity and has received much research attention over the past two decades (Kiewra, 1985b). Therefore, this preliminary study manipulated student notetaking activity and teacher enthusiasm and tested for their joint effects on students' cognitive learning of lecture material. Such a study is important because it is the first to respond to the charge by other researchers to assess such an interaction (Kiewra, 1987; Ladas, 1980).

Collins (1978) identified eight indicators of teacher enthusiasm: A rapid, varied, uplifting vocal delivery; wide, open eyes; frequent, demonstrative gestures; varied, dramatic body movements; varied facial expressions; exhuberant overall energy level; varied word use, including many adjectives; and ready, animated responsiveness to students' ideas and feelings. Importantly, several studies employing Collins' enthusiasm variables have found them to increase student attentiveness and on-task behavior but to produce no significant differences in student achievement (Bettencourt et al., 1983; Burts, McKinney, & Burts, 1985;

McKinney, Robertson, Gilmore, Ford, & Larkins, 1984). This suggests that teacher enthusiasm alone may have little direct impact on students' cognitive learning (Brophy & Good, 1986). But by virtue of its apparent direct effects on student attention and motivation it could interact with student learning activities such as notetaking to determine cognitive outcomes.

Ladas (1980) and Kiewra (1987) delineated several factors that can constrain the effects of notetaking for learners, one of which is teacher enthusiasm. The broad premise is this: To the extent that factors associated with information presentation enhance or interfere with the learner's processing of the information, retention of the information will be either facilitated or debilitated (Ladas, 1980). Based on this premise, at least three information processing factors lend to the possibility that teacher enthusiasm and student notetaking interact to effect learning outcomes. One is student attention. The more enthusiastic lecturer promotes attention and perception (Bettencourt et al., 1983; Ladas, 1980; Shuell, 1988). Notetaking also is presumed to facilitate student attention to the lecture material (Einstein, Morris, & Smith, 1985; Hult, Cohn, & Potter, 1984; Shuell, 1988). The second factor is the provision of associative cues. A more enthusiastic style provides the learner numerous mnemonic elements with which information can be associated (Ladas, 1980; Norton, 1983) to facilitate rehearsal, consolidation, and reconstruction of information during note review (Kiewra, Benton, & Lewis, 1987). The third factor is student motivation and interest. Student motivation to engage in learning activities such as notetaking is reliant on positive, stimulating teacher behavior (Bettencourt et al., 1983; Ladas, 1980; Thomas, 1988). In summary, then, notetaking is a learner initiated activity which serves to maintain attention to information being presented and provides a record of information that can later be reviewed for further processing (DiVesta & Gray, 1972). Teacher enthusiasm serves to highlight and give emphasis to lecture content and assists students in assimilating that material for meaningful processing (Shuell, 1988).

Whereas notetaking activity has consistently proven more conducive to learning than listening only (Kiewra, 1985b), it is possible that the activity can be a distraction from information that might otherwise be gotten during lecture. This possibility is especially apparent given the mnemonic benefit of more enthusiastic teacher behavior. Notetaking could either detract the learner's attention from overt teacher behaviors that could be associated with lecture information or interfere with the learner's short-term listening capacitites (Bostrom & Waldhart, 1988). On the other hand, notetaking could be more conducive to learning than listening-only when the lecturer is less enthusiastic. In this case a slower lecture pace with relatively little movement and vocal expression should provide notetakers more opportunity to record information accurately (Aiken, Thomas, & Shennum, 1975; Kiewra, 1985a), but it would be a detriment to listening-only since the less enthusiastic presentation would likely deminish student attention and arousal. When students review their notes taken from a lecture, it is likely that a more enthusiastic lecture will provide mnemonic cues helpful to the learner's rehearsal and consolidation of noted material and reconstruction of non-noted material so that learning would be facilitated. Alternately, review of notes might produce high cognitive performance even when the lecturer is less stimulating if such a presentation does in fact afford the learner opportunity to take better notes from which the benefits of review can be derived. According to these possibilities, the primary purpose of this study was to address the following research question: Are there significant differences in learners' recall and recognition of lecture material as a function of an interaction between learning activity (listen-only vs. notes-only vs. review of notes) and the lecturer's relative enthusiasm (less enthusiastic vs. more enthusiastic)?

METHOD

Participants in this study were 142 college students from six sections of introductory communication courses at Texas Tech University. Inspection of class rosters showed that the sample was comprised of about an equal number of males and females, that majors in each of the university's colleges were represented, and that over 70% of the students were freshman and sophmores, about 20% were juniors, and the remainder were seniors. Participants were assigned by section to listen only, take notes only, or take notes for later review when presented a lesson by either a less enthusiastic or a more enthusiastic lecturer. This produced a 3 X 2 factorial design. Each condition was conducted in a single 70-minute class period in the section to which it was assigned. The same male lecturer was used in all six conditions. He spoke on the topic of communication apprehension. The less enthusiastic lecture consisted of the lecturer maintaininig a position behind a table, making little or no eye contact with students, speaking in a monotone voice at a rate of about 100 wpm, holding neutral facial expression, using few if any gestures, and refraining from using many qualifiers, illustrations, or examples. The more enthusiastic lecture involved standing in front of the table or podium and moving about the front of the room, maintaining almost consistant eye contact with students, speaking with varied tone, volume, and rate at or above the normal 150 wpm, smiling often, using frequent gestures for emphasis and illustration, and using numerous qualifiers, examples, and stories. The lecturer rehearsed both styles several times until it was determined that each one could be performed with consistency. On a series of five bipolar scales, ratings of the lecturer's enthusiasm were significantly different ($t = 5.94$, $p < .001$) for participants in the less enthusiastic ($M = 17.12$, $SD = 2.32$) and more enthusiastic ($M = 20.49$, $SD = 2.37$) conditions.

At the start of each class period participants were directed to either "listen attentively to the lecture by not taking any notes" for the listen-only conditions, or to "take notes on the lecture" for the notes-only and notes-review conditions. The lecture then commenced and lasted approximately 45 minutes. After the presentation, participants in the listen-only and notes-only conditions were instructed to take out a sheet of paper and write a brief summary of their last reading assignment, which dealt with a topic different from that of the lecture. Participants in the notes-review condition were instructed at the end of the presentation to review their notes. After seven minutes elapsed, participants were administered a test containing recall and recognition items and given the remainder of the class period, between 15 and 20 minutes, to complete it.

The test consisted of nineteen items. Seven were multiple-choice items with four response options each, for a total of seven points possible on the recognition (RGN) score. There were six simple recall items — completion or fill-in-the-blank items requiring one-word responses — for a total of six points possible on the simple recall (SRC) score. There were also six complex recall items — either definition items or multiple fill-in-the-blank items — worth up to four points each, for a total of twenty-four points possible on the complex recall (CRC) score. The full sample of tests was scored by a student assistant under the guise that they were actual course exams. A randomly selected subsample of ten tests from each treatment group was independently scored a second time by the experimenter. There was 100% agreement between the two scorers on the RGN and SRC items, and 97% agreement on the CRC items.

RESULTS

Raw scores on the RGN, SRC, and CRC items were converted to z-scores, then entered as dependent variables to a 3 X 2 multivariate analysis of variance crossing learner activity (listen, notes-only, review notes) with enthusi

asm level (less enthusiastic, more enthusiastic). Means for each condition on each of the three dependent measures are presented in Table 1. The overall interaction effect was significant (Wilks' lamda = .734, $F_{APP}(6,268)$ = 7.48, $p<.001$; R_c^2 = .27), showing that differences in learning did occur as a function of an interaction effect between student notetaking activity and lecturer enthusiasm. Univariate F's and pairwise *t*-tests were used to probe this result. The interaction effect did not involve RGN scores ($F(2,136) = .24, p>.10$) or CRC scores ($F(2,136) = .24, p>.10$) but was significant for SRC scores ($F(2,136) = 19.85$, $p<.001$, $eta^2 = .21$). Students in the notes-only/less enthusiasm ($M = .74$) and review/more enthusiasm ($M = .70$) conditions scored significantly higher on the simple recall items than did students in any of the other four conditions. These two conditions were not significantly different from one another on SRC scores. The interaction is depicted in Figure 1 and shows a disordinal effect.

In light of the disordinal interaction effect, main effects for notetaking activity and enthusiasm level were also examined. The overall main effect for notetaking activity was significant (Wilks' lamda = .823, $F_{APP(6,268)}$ = 4.57, $p<.001$; R_c^2 = .15), indicating that there were differences in learning as a function of notetaking activity alone. Univariate tests revealed significant effects of acqusition on SRC scores ($F(2,136) = 5.90$, $p<.01$, $eta^2 = .05$) and on CRC scores ($F(2,136) = 11.34$, $p<.001$, $eta^2 = .14$), and a marginal effect on RGN scores ($F(2.136)\ p = .06$, $eta^2 = .04$). On all three sets of items, students in the listen-only condition (*M*'s = -.32, -.51, -.26 on SRC, CRC, RGN respectively) performed at lower levels than those in either the notes-only (*M*'s = .04, .35, .15 on SRC, CRC, RGN respectively) or notes-review (*M*'s = .30, .20, .17 on SRC, CRC, RGN respectively) conditions. There were no reliable differences between the notes-only and review-notes conditions on any of the learning scores. The overall main effect for enthusiasm level was nonsigni-

TABLE 1
Z-score Means for Recognition (RGN), Simple Recall (SRC), and Complex Recall (CRC) Across Learner Activity and Lecturer Enthusiasm Conditions.

(a) Learner Activity/ Lecturer Enthusiasm	(n)	RGN	SRC	CRC
Listen/Less Enthusiastic	(25)	-.47	$-.45_{ab}$	-.51
Listen/More Enthusiastic	(24)	-.06	$-.18_{cd}$	-.52
Notes/Less Enthusiastic	(26)	.17	$.74_{ace}$	.25
Notes/More Enthusiastic	(20)	.12	$-.67_{ef}$	.44
Review/Less Enthusiastic	(29)	-.01	$-.10_{ef}$	.24
Review/More Enthusiastic	(18)	.35	$.70_{bdf}$	.16
(b) Learner Activity				
Listen	(49)	$-.26_{ab}$	$-.32_{ab}$	$-.51_{ab}$
Notes	(46)	$.15_{a}$	$.04_{a}$	$.35_{a}$
Review	(47)	$.17_{b}$	$.30_{b}$	$.20_{b}$
(c) Lecturer Enthusiasm				
Less Enthusiastic	(80)	-.10	.06	.00
More Enthusiastic	(62)	.14	-.05	.02

Note: Within each panel, column means with the same subscript are significantly different, $p<.05$.

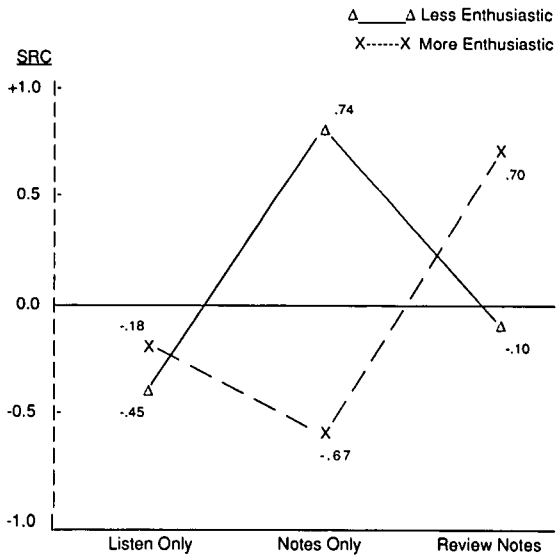

Figure. 1. Mean simple response recall (SRC) as a function of learner activity and lecturer enthusiasm.

ficant (Wilks' lamda = .974, $F_{APP}(3,134)$ = 1.18, n.s.) as was the univariate test on each of the criterion measures.

DISCUSSION

This study found an interaction effect on student learning due to teacher behavior and student learning activity. The obtained effect suggests that differences in lecturer enthusiasm were more important when students took notes than when they simply listened, at least for simple recall tasks. Prior evidence suggested that students who take notes from a lecturer with a slower-paced, more deliberate style of delivery would have greater capacity to meaningfully process the lecture information during notetaking (Aiken et al., 1975; Kiewra, 1985a). This could explain why students in the notes-only/less enthusiastic condition outperformed those in the notes-only/more enthusiastic condition. Students in the notes-review/more enthusiastic lecturer condition performed statistically as well as students in the notes-only/less enthusiastic condition perhaps because the animated teacher behaviors provided some sort of mnemonic benefit to those learners during review. Essentially, the expressive vocals, frequent smiles, and demonstrative gestures of the more enthusiastic lecturer offered mnemonic cues (Bettencourt et al., 1983; Norton, 1983) that students could rely on for consolidation and rehearsal of noted material and perhaps even reconstruction of non-noted material (Kiewra, 1987). Observers of the less enthusiastic lecturer were not afforded such cues, at least in as high a degree or amount.

An important question concerns why the interaction was reliable only for simple, rote-like recall. A possible explanation is that the interaction term was not powerful enough to detect true differences in the scores for more complex recall (CRC) and recognition (RGN). With alpha set at .05 for the sample of 142, post-hoc power estimates for the series of univariate ANOVAs to probe the MANOVA were .75 for medium effects. Nevertheless, scrutiny of the CRC and RGN means in panel (a) of Table 1 shows that for both sets of scores, students in the listening conditions consistently scored below the mean while those in the notetaking conditions scored above it, with exception to RGN in the review-notes/less enthusiastic condition. As such, the CRC and RGN scores tended to vary more by learner activity than by lecturer enthusiasm, so that reliable differences were unlikely to be obtained by the interaction term. This reasoning is substantiated by the finding of a significant main effect for learner activity but not for lecturer enthusiasm. New studies could improve on this one by measuring higher-level achievement over a longer period of time.

The failure of differential lecturer enthusiasm to produce significant main effects on learning suggests that the impact of enthusiastic teacher behavior on students' cognitive learning was more indirect than direct. Apparently, teacher enthusiasm works to stimulate student interest and motivation to the point that on-task activity and subsequent learning will be higher than when the teacher is less enthusiastic (Bettencourt et. al., 1983; Norton, 1983). As such, lecturer enthusiasm did not produce reliable differences in student learning apart from its interaction with notetaking activity. A competing explanation for the lack of a main effect for lecturer enthusiasm is that its manipulation in this study did not adequately differentiate high and low levels of enthusiasm. The manipulation check obtained a mean enthusiasm rating of 20.49 for participants in the more enthusiastic group and of 17.12 for those in the less enthusiastic group. Although these means were significantly different, the latter mean is in the moderate range of the rating scale (scores could range from 5 to 25), so "boring" or "dull" teaching, in the sense of litle or no enthusiasm, was not actually observed by these participants. Another study also obtained no significant effects for enthusiasm when contrasting high and moderate levels (McKinney et. al., 1984). Future experimental research should

take care to produce more extreme differences in the manipulation of teacher enthusiasm, but it may be that naturalistic studies of teachers rated as more or less enthusiastic by their students could better identify an interaction with student learning activities.

The results of this study are preliminary and, because they are mixed, make it difficult to draw specific conclusions. The study would seem to point to the need, however, for instructional communication researchers to begin investigating how teacher communicative behavior affects and is mediated by student learning activities. Some of this study's limitations, as noted above, should be instructive for additional research of this sort. Instructional researchers in other disciplines are harvesting ample support for the premise that learning outcomes depend jointly on teaching activity and learner activity, but their findings could be enriched by studies done from a communication perspective.

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